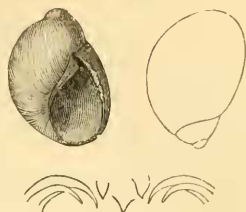


J. B. Wilson, Esq., together with numerous other interesting marine Invertebrata. It was dredged in Port Phillip Bay, South Australia.

The annexed woodcut represents the shell one half the natural size and a greatly magnified view of one of the transverse series of the lingual teeth.



XXVIII.—*Supplement to the Descriptions of Mr. J. Bracebridge Wilson's Australian Sponges.* By H. J. CARTER, F.R.S. &c.

[Plate X.]

HAVING finished the description of Mr. J. Bracebridge Wilson's Australian Sponges which came to me in his first consignments, I have now to add in the following "Supplement" descriptions of those which have been received since, and further to supply any omissions and corrections that may be necessary in what has already been published, including replies to objections that have been made to any parts of the latter.

Taking the orders again as they stand in my Classificatory Arrangement of 1875 ('Annals,' vol. xvi. p. 131 &c.), I would observe that the plan adopted latterly in my descriptions of these Australian Sponges, viz. that of inserting a copy of the tabular view of this arrangement for more convenient reference at the commencement of each order, was omitted in the CARNOSA and CERATINA; hence this will now be supplied.

Order I. CARNOSA.

Fam. 1. Halisarcida.

Char. Possessing no spicules.

Fam. 2. Gumminida.

Char. Possessing spicules.

I also omitted to note what I had written on the subject, viz. a paper on all the then-known species of CARNOSA, in the 'Annals' of 1881 (vol. viii. p. 241 and "Addendum," p. 450).

To this I would add the illustrated observations of Prof. F. E. Schulze on the development of the species of *Halisarca*, the *family* of the Chondrosidæ, and *Corticium candelabrum* respectively (Zeitschrift f. wiss. Zoologie, Bde. xxviii. and xxix. of 1877 and Bd. xxxv. of 1881); also Dr. R. v. Lendenfeld's "Preliminary Report on the Australian Myxospongiæ" (Proc. Linn. Soc. N. S. Wales, vol. x. pt. 1, p. 139, pls. i.-v.).

With reference to my account of "*Halisarca australiensis*" in the 'Annals' of 1885 (vol. xv. p. 196), Dr. v. Lendenfeld has stated (*ib.* vol. xvi. p. 21) that "it is not a sponge at all, but the crusts described by Carter under the above name are the ova of *Boltenias* surrounded by their folliculi;" which, *ab initio*, may be refuted by simply drying a piece of the stem of a *Boltenia* with a portion of the crust on, when the latter will be found to be homogeneous in structure, like dry glue, and the former heterogeneous (that is, the cartilage of which the stem is composed), more or less charged with the cells, which Dr. Lendenfeld appears to me to have mistaken for "folliculi" of the *Boltenia*.

If, now, we go further, and examine a portion of the ovary of the Ascidian itself, it will be found that the ripening of the ova for expulsion takes place *successively*, so that the whole is not discharged at once in a mass, like the spawn of Gastropods &c., and therefore could not form a "crust" on the stem of the *Boltenia*.

While if sections be made of the "crust" when fresh or undried, it will be found to contain no appearance of ova whatever, but, on the contrary (especially when stained), will be found to present pores on the surface leading into elongated chambers, followed by the ampullaceous sacs (Geisselkammern) themselves; thus, independently of the dried condition, proving at once that the crust on the stem of *Boltenia australiensis* is not the spawn of an Ascidian, even if there were such a thing, but a *bonâ fide* Halisarcous sponge.

Having had to repeat my examination of this "crust," together with that of the other specimens of *Halisarca australiensis* whose characters were originally included under this heading, it now seems to me that in my description I have mixed up at least *three* forms, which might be more conveniently divided into *Halisarca australiensis*, *H. ascidiarum*, and *H. reticulata*, since the solidity of the former, the incrusting character of that on the stem of *Boltenia australiensis*, and the strongly marked reticulated structure of the surface of the latter, if not specifically distinct, are so varietally.

Taking them separately, then, they may be distinguished thus :—

Halisarca australiensis.

Massive, cuboidal or plano-convex, spreading, growing over the detritus of the sea-bed of the locality (agglomerated sand and shells), or unattached and free; following no particular shape, but generally more or less round and lobed. Consistence doughy. Colour grey or brown. Surface very smooth, puckered here and there, presenting under the microscope a thin layer of small epithelial cells, covering a soft fibro-reticulated structure, whose interstices represent the subdermal cavities. Pores in the epithelial layer over the interstices. Vents single, here and there on the smooth parts and in the puckered depressions respectively. Structure (as seen in the vertical section) commencing from the outside with the thin layer of epithelium, followed by the soft reticulated structure, into whose interstices the pores open, and then the body-substance, more or less traversed by lacunæ and the canals of the excretory systems, whose forms, whether vertical and crevice-like or oblique and transverse, are influenced by the line of section, surrounded more or less radiatingly by aggregations of ampullaceous sacs, which are subglobular or pyriform. Size of specimens, of which there are several, as variable as their form, but not more than 2 inches in their longest diameter.

Obs. It will therefore be observed that the plan of structure is the same as that of all other sponges. How the particles of nourishment which pass in with the water through the pores are subsequently conveyed to the ampullaceous sacs remains to be shown.

Halisarca ascidiarum.

Incrusting, growing over the surface of sessile as well as stalked Ascidians, more especially over *Boltenia*, seldom more than 1-12th in. in thickness, and presenting a creno-tuberculated or mesenteric form of surface corresponding to that of the subjacent cartilaginous test, but not of the stem, where it is even still more creno-tuberculated, while the stem remains smooth, so that it is probably the form assumed by the *Halisarca* itself. Consistence yielding, like that of soft dough. Colour pinkish or brownish white. Surface very smooth, presenting under the microscope a thin layer of small epithelial cells, covering a soft homogeneous fibro-reticulation, whose interstices represent the subdermal cavities. Pores in the

epithelium covering the interstices. Vents not seen. Structure generally compact, and the parts mentioned in *H. australiensis* so indistinctly and delicately developed that, although evident, I have not been able to make a vertical section in which the forms of the ampullaceous sacs could be satisfactorily seen; still the form, if not identical, appears to be but a variety of *H. australiensis*, chiefly dependent on its habit for its differences. The "creno-tuberculated" state may be an exaggerated form of the puckerings on the surface of this kind of sponge generally.

Halisarca reticulata.

Enveloping with a thin layer the calcareous fronds of Reteporian and Escharidian Polyzoa, uniting through the interstices of the former; varying in thickness under 3-24ths in. Consistence exceedingly tough. Colour whitish grey. Surface smooth, presenting a tough fibro-reticulated structure, with more or less *round* interstices, covered by a thin epithelial layer. Pores in the interstices. Vents here and there indicated in their position by the centres respectively of sub-stellate, branching, superficial, excretory canal-systems in the form of venations, which are seen just below the epithelium. Structure essentially fibrillous throughout, commencing (in the vertical section) with the thin epithelial layer, followed by the fibro-reticulated one, whose tough fibrillæ extending inwards are accompanied by the usual subglobular form of ampullaceous sacs, succeeded in one specimen by the development of small ova, each furnished with a germinal vesicle and its nucleolus or germinal spot, and about 8-6000ths in. in diameter. These are situated in juxtaposition in the midst of a tough fibrillous trama, but each separate and provided with a cell-cavity, which, on being scratched out from the general mass, comes away with the ovum inside it, while the surface of the "cell-cavity" is fringed with filaments which appear to have been in connexion with the fibrillæ of the trama. Size of specimen indefinite, following that of the fronds of the Polyzoon on which it may be growing. There are three large specimens of this species, viz. one from "Port Phillip Heads" and the other two from "Port Western," all growing on the same kind of Polyzoa, and all presenting the same characters, which, from the strongly marked and tough retiform fibre-structure of the surface, has been designated "*reticulata*." It is totally different from either of the foregoing forms in this respect and from every other species of this order that I have seen, so that I am in doubt whether it

should not be made the type of a new genus, in which case the generic name would have to be changed.

There is still another species among the specimens from "Port Western," which may be characterized under the following name:—

Halisarca tessellata.

In every respect this is like the brown-coloured specimens of *H. australiensis* from the same locality; but the surface presents a fibro-reticulated arrangement, in which the interstices are characteristically *polygonal*, although variable in size and number of sides. The margin (in the vertical section) presents a uniform succession of translucent separated spaces, which correspond with the vertically cut ends of the dermal fibro-reticulation, and the ampullaceous sacs are almost *linear* in form, that is ten times longer than they are broad.

Besides the difference in consistence generally the dermal fibro-reticulation, although like that of *H. reticulata*, is not accompanied by *circular* or elliptical interstices, as in the latter, but by polygonal ones, as above stated. The succession of transparent spaces in the vertical section of the margin is more uniform, and the ampullaceous sacs are *linear*, and not subglobular or pyriform.

Notwithstanding this difference in the form of the ampullaceous sacs, some of the latter, when viewed in the vertical section of the *other* species, occasionally appear to be much more narrow than the rest, hence considerably resembling the form of those in *H. tessellata*. This, however, it should be remembered may depend on the line of section, which, if passing through the *short* diameter of a compressed pyriform ampullaceous sac, would give the *linear* form. Hence it, with many more questions of a like nature, in all these species should be worked out more satisfactorily, since in this necessarily hasty sketch I am only able to direct attention to the existence in the localities mentioned of species of the CARNOSA, to which it is desirable to give more extended examination.

All the structure of *Halisarca australiensis* may be seen in *Halisarca Dujardini* when the latter is fresh, only being more delicate it is not so strongly marked, in short not so strongly developed, in the British species; and if *H. lobularis* were covered with a cortical layer it would, in like manner, present the same appearance, for the most remarkable part of this sponge is its *active ciliated surface*.

Here I might add that the species of *Halisarca* described

and illustrated by Merejkowsky under the name of "*H. Schulzii*" (Mém. Acad. Sc. St. Pétersb. 1878, tome xxvi. no. 7, pl. i. figs. 1-6, and pl. ii. figs. 9-15) appears to me to be no other than *Halisarca Dujardini*, which is as abundant on the rocks and *Fuci* at Budleigh-Salterton (S. Devon) at "half-tides" as in the "White Sea."

In 1874 I gathered some branches of the small *Fuci* here bearing specimens of this sponge, and put them at once, that is on the spot, into some sea-water containing indigo paint in solution, in order to see if the sponges took in the latter, which was the case; so I placed the whole in spirit for preservation. Now (in 1886), finding that Merejkowsky had discovered certain "glands" in his species (*l. c.* p. 32, pl. ii. fig. 9*b*), and conceiving that it was the same as *H. Dujardini*, I gently raised one of the specimens (about 1-12th in. in diameter) from the frond of the *Fucus* to which I have alluded, and placing it in a microscope-cell filled with *glycerine*, brought it under a magnifying-power of about 300 diameters, when, to my great delight, I saw the cells which Merejkowsky had described and represented, particularly as he has stated, viz. about the "osculum" (p. 33), which, projecting from one side of the object, is in a very favourable position for observations of this kind, that is by transmitted light. Moreover, as the spongozoa had become coloured by the indigo, while not a particle was to be seen in these bodies, termed by Merejkowsky "glands," it is evident that the latter at least are not for *nutrient* purposes.

After this I stripped off a bit of the dermis from one of Mr. Wilson's specimens of *Halisarca australiensis*, and having stained it with blue ink, also mounted this in a "cell" with *glycerine*, when a similar layer of bodies became equally evident, *mutatis mutandis* of course, that is with more strongly marked fibrous structure than in *H. Dujardini*, so that the difference between the two was rather quantitative than qualitative, as before explained.

Similar bodies in his *Dendrilla rosea* &c., from the south coast of Australia, were described and represented by Dr. v. Lendenfeld in 1883 (Zeitschrift f. wiss. Zoologie, Bd. xxxviii. p. 278, pl. xii. fig. 21*d*), and by Dr. Poléjaeff in 1884 ('Challenger' Reports, vol. xi. pt. xxxi. KERATOZOA, p. 40, pl. ii. fig. 5), in *Ianthella*, &c. So that the existence of these organs is well established and probably their function, that which Merejkowsky originally assigned to them, viz. "unicellular glands," which secrete the "viscous" matter of the surface (*l. c.* p. 34).

Lastly I would allude to the following variety of *Halisarca australiensis* in Mr. Wilson's collection from "Port Western," which might be designated

Halisarca australiensis, var. *arenacea*.

It is much lighter in colour than the rest, owing probably to the presence of quartz-sand, with which it is abundantly charged, thus affording another instance of what occurs in *Gummina gliricauda*, Sdt., &c., whose consistence, viz. that of soft caoutchouc or india-rubber, is similar to that of *Halisarca australiensis* (see my paper on the CARNOSA, *op. et loc. cit.* p. 248, respecting this sand in the Halisarcida).

Chondrilla nucula, Sdt.

I have already alluded to the specimen of this species which came from "Port Phillip Heads" ('Annals,' *l.c.*), in the description of which, however, the size of the globostellate spicules, which I now find to average 4-6000ths in. in diameter, is not mentioned. This is the size also of the globostellates in two other specimens from "Port Western," one of which, growing upon and half imbedding large fragments of mussel-shells, is $4\frac{1}{2}$ in. long by $1\frac{1}{2}$ in. in diameter more or less, being irregularly cylindrical in shape, and bearing the usual minute papillæ charged with globostellates on its surface; varying in size under 1-160th in. in diameter, and about the same distance apart.

Chondrilla secunda, Lendenfeld.

Chondrilla secunda, Lendenfeld, Proc. Linn. Soc. N. S. Wales, vol. x. pt. i. p. 151, figs. 10-12.

Specimen flat or only slightly convex; sessile throughout; growing on the calcareous test of a Polyzoon. Colour light yellowish brown. Surface even, smooth, like glass, minutely granulated. Pores plentifully scattered over the surface. Vent single, situated towards one end of the specimen. Structure internally consisting of a brownish, pulpy, elastic tissue, surrounded by a thick, rigid, cartilaginous cortex, through which (in the vertical section) the pores may be seen to descend, increasing in size towards the usual interlobular lacunose crevices of the body. Spicule of one kind only, viz. globostellate, of different sizes under 18-6000ths in. in diameter, whose spines may be sharp-pointed or obtuse. Chiefly aggregated towards the surface, where, together with a great number of pigment-cells, they respectively add to the consist-

ence and dark colour of the cortex produced by the latter. Size of specimen 11-12ths \times 7-12ths in. horizontally and 4-12ths in. high in the centre.

Loc. Port Western.

Obs. To this variety of *Chondrilla nucula* Dr. v. Lendenfeld has given the above name. My specimen does not appear to contain the smaller stelliform spicules which he has represented (*l. c.*).

Chondrilla papillata, Lend.

Chondrilla papillata, Lend. *op. et loc. cit.* p. 153, figs. 13-16.

Specimen irregularly elliptical, flattish, convex, contracted towards the base, which had been attached to the calcareous test of a Polyzoön. Colour greenish or greyish stone. Surface papillated over the upper part, becoming smooth beneath; papillæ hemispherical, in strong relief, in juxtaposition, and averaging 1-66th in. in diameter at the base, smooth and slippery, but minutely granulated. Pores on the surface, not well seen. Vents three in number, situated respectively in the deep, puckered, crevice-like depressions usually present, as before stated, on the surface of such sponges, the largest presenting at the bottom a cribriform structure that represents the openings of several excretory canals which empty themselves at this point. Structure internally consisting of a thick rigid cortex, about 1-48th in. in diameter including the papillæ, surrounding a lighter-coloured, elastic, pulpy tissue, presenting the usual crevice-like lacunose vacuities, decreasing in size towards the circumference, where they become subdivided and thus end in the pores. Spicule of one form only, viz. globostellate, in which the spines are pointed, globostellate, comparatively small, averaging 4-6000ths in. in diameter; chiefly congregated in the papillæ, where they form the granulated surface, and, together with an abundance of pigmental cells, add respectively to the consistence and colour of the cortex. Size of specimen about 4-12ths \times 7-12ths in. horizontally, and 4-12ths in. high.

Loc. Port Western.

Obs. In this specimen also I did not see any of the stelliform spicules represented by Dr. v. Lendenfeld, although there can be no doubt that it is the same species as that which he has described and illustrated under the above name.

As regards the diameter of the "globostellates" in different species of *Chondrilla*, I find that in *C. nucula*, Sdt., it is 7-6000ths; in *C. australiensis*, Cart., 7-6000ths; in the

specimens of *C. nucula* from "Port Phillip Heads" &c. 4-6000ths; in *C. secunda*, Lend., 18-6000ths; in *C. saciformis*, Cart. (Mauritius), 27-6000ths; and in *C. papillata*, Lend., 4-6000ths.

I omitted to mention that in all the *Chondrillæ* there appears to be a horizontal, more or less interrupted cavity traversed by filaments between the cortex and the body, like the subdermal cavities of sponges generally, which not only marks the division between the two, where they are easily separable, but into which the pores empty themselves before their contents are continued on to the interior of the body.

Such a line of demarcation does not appear in the varieties of *Halisarca* above mentioned.

Order II. CERATINA.

Having also in my descriptions of the Australian species in this order, which have been already published, omitted to premise, for more convenient reference, the classificatory arrangement of 1875, it is herewith supplied as tabulated at p. 188 (*op. et loc. cit.*).

Fam. 1. Luffarida.

2. Aplysinida.

3. Pseudoceratida.

For the characters of these "families" respectively I must refer the reader to p. 134 &c. (*l. c.*), where they are given *in extenso*; while I take this opportunity of briefly stating whence the names of the first and second families here have been derived.

In 1794 Esper described and illustrated a species named "*Spongia fistularis*" ('Pflanzenziere,' vol. ii. tab. 21 a), which, in 1816, Lamarck identified with one of the same kind in his "Cabinet" (Anim. sans Vertèbres, tome ii. p. 367); and in 1845, Bowerbank changed the generic name of "*Spongia*" to "*Verongia*" (in honour of Dr. Veronge, who sent the specimen to him), adding the following diagnosis of its fibre, accompanied by equally good illustrations, viz. :—

"Skeleton composed of a network of keratose fibres inosculating in every direction without order. Fibre cylindrical, continuously fistular, without spicula. Cavity of the fibre simple" ('Annals,' vol. xvi. p. 403, pl. xiii. fig. 7), whereby Esper's "*Spongia fistularis*" became *Verongia fistularis*, Bowerbank.

Meanwhile, in 1833, Nardo, in his classification of the

Sponges generally, had made a genus under the name of "*Aplysia*," which, in 1834, he altered into "*Aplysina*;" and, further, divided into two "subgenera," which were respectively characterized by the possession of "flaccid" (*fibris flaccidis*) and "more rigid" (*rigiditatis majoris*) fibres (Isis, Spong. Classificatio), thus establishing structurally their most striking differences, as I can testify by possessing specimens of *Spongia fistularis*, Lam., and *Aplysina*, Sdt., respectively from Nardo's neighbourhood, that is the Mediterranean. Hence it may be inferred that Nardo was acquainted with both forms when he laid down their characters respectively (Venice, 1834). In short, this is certain as regards *Spongia fistularis*, for Ehlers, in 1870, identified Nardo's type specimen in the Museum at Erlangen with "*Verongia fistularis*," Bk. (Esperschen Spongien &c.).

In 1864, De Fonbressin and Michelotti made a "tribe" of the "more rigid" of these sponges under the name of "SPONG. HOMOGENÆ," wherein they were classed under one genus named "*Luffaria*" (Spongiaires de la Mer Caraïbe, p. 58); while Schmidt, in 1870, pointed out, by description and illustration, that which Nardo had done in 1834, only in different terms, viz. the distinction between *Spongia fistularis* and *Aplysina* (Atlantisch. Spongienf. p. 30, Taf. iii. figs. 15 and 16, respectively), accepting at the same time De Fonbressin and Michelotti's name of "*Luffaria*" for the former.

It therefore seems evident that Nardo's first subgenus, viz. "*Aplysinæ spongelia*," constitute my "*Aplysinida*;" and that his second subgenus, viz. "*Aplysinæ velaria*," = *Spongia fistularis*, Esper (altered generically to "*Verongia*" by Bowerbank, and subsequently, without any allusion to the latter, by De Fonbressin and Michelotti to "*Luffaria*," which term was accepted by Schmidt also without any allusion to Bowerbank's name), forms my "*Luffarida*."

Hence, in matter of nomenclatural precedence and custom I should have used the term "*Verongida*" for the family, but having unconsciously adopted that of "*Luffarida*" after Schmidt for such sponges, in my classification, "*Verongia*," as originally instituted, must now come in as a genus illustrated by "*Verongia fistularis*," as typical of the "*Luffarida*," unless hereafter it may be considered proper to discharge the latter altogether. It is not necessary that a family name should be based upon that of any particular genus in that family, if upon any at all, for many genera may be formed upon single species by different people and under different names, which finally some one may consider it desirable to place in one family under his own name.

But to return to the more legitimate object of this communication, it may be stated that, in 1881, I published a paper on the "*CERATINA*," in which some new species were described and illustrated, together with observations on the development of the "fibre" ('Annals,' vol. viii. pp. 101 and 113, respectively, pl. ix.); and in 1882 other species from the West Indies were added (*ib.* vol. ix. p. 268 &c.). Since which nothing occurred to cause me to return to the subject until the arrival of Mr. Wilson's sponges from "Port Phillip Heads" in 1885, to the descriptions of which I have now to add the following supplement.

Dendrilla rosea, Lendenfeld, var. *digitata*, Cart.

With reference to the specimen which I described in 1885, under the name of "*Luffaria digitata*" ('Annals,' vol. xv. p. 201), I now find on reexamination of it, aided by Dr. R. v. Lendenfeld's valuable description and illustrations (Zeitschrift f. wiss. Zoologie, Bd. xxxviii. p. 271, Taf. x. figs. 3 and 4, a copy of which he kindly sent me), that it is not a "*Luffaria*," but an "*Aplysina*" (following Schmidt's distinctive characters); still, the designation "*digitata*" applies to my form, which is that with which, through Mr. Wilson's specimens, I am most familiar, better than to that of Dr. Lendenfeld's typical illustration, although they both present the same dendritic, *unananastomosing* character of the fibrous skeleton, of which therefore mine can only be considered a variety, as above designated.

Nothing can be more striking than the differences in structure of the *Luffarida* and the *Aplysinida* (which certainly I overlooked in the present instance), inasmuch as the fibre of the former is unyielding and almost wiry in consistence, both wet and dry, with a continuous, anastomosing, central, tubiform core; while in the latter it is more or less flaccid with an *unananastomosing* core. The course of the core, too, in *Luffarida* is uniform, while in the *Aplysinida* it is interrupted transversely by parabolical lines of growth, which apparently is an unfailing sign of the fibre.

Of the *Luffarida* there is an abundance of specimens in the British Museum, viz. tubular and cylindrical, branched and solid respectively, many of which are very large, *ex. gr.* the specimen from the Gulf of Honduras, described under the name of "*Luffaria Archeri*" by Mr. Th. H. Higgin, F.L.S. ('Annals,' 1875, vol. xvi. p. 223), which is a curved trumpet-shaped tube, 3 ft. 9 in. long, and 5 in. in diameter at the free end. Most of these specimens come from the West Indies, but there are others in the collection which were purchased

from the executors of the late Dr. Bowerbank, labelled "S. Australia," and also one in spirit from the island of Crete, in the Levant, which was obtained and presented to the Museum by Admiral Spratt, who surveyed this island. But of the Aplysinida there are very few specimens indeed, perhaps because the flaccidity of their skeletons, when dry, gives them such a worthless aspect.

Thinking that Prof. A. Hyatt's "*Dendrospongia*" might be very nearly allied to *Dendrilla rosea*, if not the same, I sent him the skeleton of a digitated macerated specimen for comparison, and received from him in reply the following, viz., "*Dendrilla* is quite different from *Dendrospongia*; the latter never has a trunk of fibres;" together with a type specimen of the latter confirmative of his statement.

The keratose skeleton of the specimen which I described in 1885 (*l. c.*) is 9 in. high, and of a light brown-amber colour, commencing from a root-like expansion of individual fibres which become gathered together spirally into a short stem nearly as broad as it is long, viz. 7-12ths in., which then divides into several long branches that go on dividing and diminishing in size tree-like, without anastomosing, to the ultimate ends of the filaments that appear at the circumference of the digitations, where the latter often project through the surface, but in their natural state simply elevate into conical points the pink flesh-like fibro-reticulate dermal sarcode with which they are naturally covered; maintaining throughout such a degree of resiliency, toughness, and flexibility that the whole specimen can be squeezed into a large bottle through a narrow neck and taken out repeatedly without breaking.

Besides the specimens of *Dendrilla rosea* there are others in Mr. Wilson's collection from "Port Western" whose skeletons in structure are quite the reverse, as may be seen from the following description of one which, for distinction sake, may be provisionally termed

Aplysina cæspitosa.

Cæspitose, consisting of a great number of short erect branches interuniting in their course upwards from the base to the circumference, so as to form a hemispherical or convex general mass of a pinkish colour. Surface presenting a soft, fleshy, fibro-reticulation like that of *Dendrilla rosea*. Pore-areas occupying the interstices of the reticulation. Vents scattered here and there. Structure sarcodic and fibrous, the former less firm in consistence than that of *Dendrilla rosea*, therefore shrinking up to almost nothing on desiccation; the latter also

commensurately thin and flaccid, although still resilient; consisting of main and lateral branches, the main ones pursuing an irregular course towards the surface without anastomosing, and the lateral ones uniting the main filaments together ladder-like, or through an intervening anastomotic reticulation of their own, whose filaments are fixed to the surface of the main fibre, with the central cavity of which, however, that of the filaments does not communicate. Colour dark amber. The whole, on desiccation, collapsing, from the thinness of the walls, into a flimsy, resilient, skeletal structure. Size of specimens, of which there are two, about 4 in. high by 6 in. in horizontal diameter.

Loc. Port Western.

Obs. The fibre of this species is invaded by a branched reticulated fungus, which traverses its central cavity, and thus renders it identical with Bowerbank's representation of the fibre of his genus "*Auliskia*" ('Annals,' 1845, vol. xvi. p. 405, pl. xiii. fig. 1), in which his "caecoid canals" are nothing more than the branches of a fungus or a "parasitic alga," as Schmidt has stated long ago (Spongien d. adriat. Meeres, 2nd Suppl. p. 10). It is somewhat curious that of the four genera created by Bowerbank in this paper (*l. c.* p. 400 &c.), viz. *Verongia*, *Auliskia*, *Stematumenia*, and *Cartilospongia*, one only, viz. the first, should be tenable, since "*Auliskia*" is characterized by a parasitic fungus; "*Stematumenia*" also by the presence of a parasite, viz. *Spongiophaga communis*, Cart.; and "*Cartilospongia*," based on the structure of bone in the "body" of a vertebra from a young whale, which may be seen among his specimens now in the British Museum. It is extraordinary that a man of such extensive microscopic experience did not see in his illustrations of the latter (*l. c.* pl. xiv. fig. 6 &c.) the "oat-shaped cavities," the "lacunæ," and the "canaliculi" of osseous structure. Indeed the odour of the specimen when I made a section of it was, without anything else, sufficient to convince me of its nature.

There is another specimen which again, for distinction sake, might be provisionally designated "*massa*," on account of its slightly lobate massive form. I say "provisionally," because there appears to me to be a great variety of *Aplysinoid* growths in the neighbourhood of "Port Phillip Heads," which possibly (if altogether considered on the spot where they can be easily obtained, as they should be) might be found to be derived from only one or two species. These varieties do not appear to me to be so much in the soft parts as in the colour and structure of the keratose skeleton. Thus in *Aplysina massa* the colour of the fleshy part is dark grey and the

skeletal fibre light brown, as will be seen by the following description; while, as I have before stated, in identical specimens of what I now know to be *Dendrilla rosea* it may be flesh-coloured and grey or colourless respectively.

Aplysina massa.

Massive, slightly lobate, sessile, contracted towards the base. Colour mouse- or dark grey. Surface even, presenting the usual dermal, soft, fibro-reticulation raised into conical points by the ends of the dermal filaments of the subjacent keratose fibre. Pore-areas in the interstices of the reticulation. Vents scattered here and there. Structure fleshy, supported on keratose fibre. Fleshy part more or less cancellated by the canals of the excretory systems; traversed perpendicularly from the circumference by large inhalant "fold-bearing" canals (that is, canals surfaced by transverse folds or sharp ridges of the lining membrane, which, partially encircling the canal in segments of a circle, thus intercross each other's terminations longitudinally like the "*valvule conniventes*" of the small intestine), which commence immediately under the cribriform pore-structure of the surface apparently without the intervention of subdermal cavities; hence the situation of their mouths respectively may be seen from the outside, as their dark circular areas loom through the cribriform structure: keratose fibre aplysinoid, of a light-brown colour corresponding with that of the flesh; consisting of large and small filaments, the former arising *singly* in a plurality of points and pursuing an unbranched, *i. e.* undivided, course to their termination, in an attenuated form respectively on the surface; the latter branching off from the former, but not by *division* of the central canal of the larger fibre, as will now be explained.

Having macerated a large portion of this specimen in water, so as to rid the keratose skeleton of all *soft* parts, the skeletal structure was placed between two pieces of glass, with sufficient water to fill up all the vacuities, in which condition it was examined under a low microscopic power, and the apparent branches found to be not divisions of the large fibres, but *additions* to their surfaces respectively, formed by the development of the "horn-cells" of the sarcode thus applied to them. I have already described and illustrated the "horn-cell" and this mode of growth in *Aplysina corneostellata* = *Darwinella* ('Annals,' 1872, vol. x. p. 107, pl. vii. figs. 4 and 5), and in the present instance they were observed to be in great plurality, attached to the outside of the larger fibres,

in all stages of development, viz. from that of simple approximation, followed by a covering composed of several layers of kersine, to that which afterwards became similarly extended into the usual laminated filament. So that it may fairly be assumed that the first-formed fibres of the skeletal structures throughout originated in this way, viz. from the "horn-cells" attached to the object on which the specimen grew. Size of specimen about 3 in. high by 3×2 in. horizontally.

Loc. Port Western.

Obs. There is another specimen of this kind in which the skeleton appears to be more reticulate but formed after the same plan, viz. by "horn-cells" applied to the exterior of the main filaments, and, indeed, so might the skeletal fibres of *Dendrilla rosea* at the commencement, although gathered together afterwards spirally from the root-like expansion into a common trunk; but they do not do so above this, for in the divisions of the *branchlets*, when placed under the microscope, the latter may be seen to arise from a budding-off of the central canal, although the subsequent thickness of the fibre appears to be added by layers of kersine applied to the exterior, that is by the sarcode, as in *Aplysina massa*.

In *Aplysina massa* too the same kind of large nucleated epithelial cells of the surface, averaging 5-6000ths in. in diameter, are to be found as in *Dendrilla rosea* &c., but accompanied by much smaller granuliferous ones, about 2-6000ths in. in diameter, that appear to be endogenously derived from them, and which, in the blood-red species about to be described, viz. *Aplysina cruor*, are seen to be the pigment-cells or bearers of the red colouring-matter of this species, all of which *first* present themselves as *coloured* granules in the large epithelial cells.

Lastly, the fibre of this species is *also* traversed by a parasite in the form of a branched fungus, which gives it the appearance of Bowerbank's imaginary genus *Auliskia*. The filaments, too, of this organism are often fructiferous.

Aplysina nævus, Carter.

Aplysina nævus, Carter, 'Annals,' 1876, vol. xviii. p. 229, pl. xii. figs. 1 c and 2.

Growing over both valves of a large mussel in an incrusting form. Consistence soft. Colour, when fresh, "coffee-brown." Surface presenting the usual soft fibro-reticulated structure, here charged with a few fine, foreign, acerate spicules and supported on the ends of short, skeletal, keratose filaments, arranged vertically, so as to raise the reticulated structure

into monticular elevations or conuli; filaments respectively fixed to the shell by an expanded base and for the most part unbranched, that is ending by a *single* point, which may or may not project beyond the dermis; presenting the usual aplysinoid structure, and the whole about 3-24ths in. long. Pore-areas in the interstices of the dermal reticulation. Vents not seen. Flesh densely charged with the parasitic cell which I have named "*Palmella spongiarum*" ('Annals,' 1878, vol. ii. p. 165). Incrustation about 2-12ths in. thick, diminishing towards the circumference. Diameter of parasitic cell 1-1½-6000th in.

Loc. Port Phillip Heads.

Obs. This seems to me to be only a variety of my *A. nævus* (*l. c.*), in which the dermal sarcode is much less charged with foreign material than in *A. nævus*.

As it is almost entirely composed of the parasitic cell above mentioned, the soft structures of the body are almost as entirely obscured by it, which is the case also with one of the specimens of the calcareous sponge called *Teichonella prolifera*, to whose description I must refer the reader for a more detailed notice of it ('Annals,' 1886, vol. xviii. p. 147).

Aplysina cruor.

Massive, growing over the valve of a *Pecten*, supported on erect keratose filaments, based respectively on the shell and subdividing twice or thrice towards the surface into several short branches; covered by the usual soft fibro-reticulated dermis, which possesses an opaque *blood-red* colour. Colour produced by the presence of small oval, granuliferous cells, about 2½-6000ths in. in their longest diameter, filling the triangular spaces left by the juxtaposition of large, circular, nucleated, flat, epithelial cells, about 6-6000ths in. in diameter, which form a layer over the fibro-reticulated structure of the surface and from which the smaller pigmental cells are endogenously derived. Pores in the interstices of the dermal reticulation. Vents here and there. Internal structure consisting of fleshy sarcode supported on erect filaments of keratose fibre; filament expanded at the base, more or less branched, as above stated, about half an inch long. Size of specimen about 2 in. square and ½ in. thick.

Loc. Port Western.

Obs. The keratose filaments of this specimen also are remarkable for the presence of a minute branched filamentous alga, composed of concatenated cells, which appears to have entered by the base.

Pseudoceratida.

Pseudoceratina typica, n. sp. (dry).

Flabelliform, circular, thick, stipitate; stem cylindrical, expanding into a circular compressed head above and into a root-like disk of attachment below. Consistence now, in the dried state, crisp and wiry, from the hardened state of the keratose fibre. Colour clear amber-brown. Surface of dermal sarcode originally covered by a reticulated layer composed of white sand, being the originally soft, fleshy, reticulated structure charged with this material. Pores in the interstices of the reticulation. Vents scattered over the surface irregularly. Structure looking like that of the main fibre of a *Psammonematous* keratose skeleton overrun by one of a *Luffaria*; the latter, which is much smaller in diameter than the former and represents the so-called "secondary fibre," interuniting the psammoniferous branches, and present generally, to such a degree in the stem as to almost conceal the psammonematous part of the skeleton; hard, cylindrical, and, from desiccation, crisp now, presenting a transparent amber-colour, traversed continuously and uniformly by an opaque, white, homogeneous, cylindrical core, in short genuine *Luffarid* fibre. Size of specimen:—total length 9 in., of which the head is $5\frac{1}{2}$ high by $7\frac{1}{2} \times 1\frac{3}{4}$ in. horizontally; stem $3\frac{1}{2}$ in. long by $\frac{3}{4}$ in. in diameter in the middle, rather compressed.

Loc. Port Western.

Obs. This specimen is preeminently typical of the family Pseudoceratida, hence its designation. Nothing can be more marked or more distinct than the two kinds of fibre of which it is composed, viz. the *Psammonematous* and the *Luffarid*, each being genuine of its kind.

Before leaving the order CERATINA it may be as well to allude again to the comparatively large, more or less flat, circular or oval, nucleated, epithelial cells, with sharply-defined cell-wall, which form a layer over the soft, fleshy, fibro-reticulated, dermal structure that especially characterizes the surface of the *Aplysine*. Such cells I described and illustrated in two "Pachytragous" sponges from this place in 1871 ('Annals,' vol. vii. pp. 4 &c. pl. iv. figs. 6 and 14), viz. *Dercitus niger* and *Stelletta aspera*, pointing out that in the former they constitute a "cortical layer" of several cells deep in which they are held together by a soft fibro-reticulated structure or "sarcodal trama," that extends more or less into "the mouths

of the larger oscules" (*l. c.* p. 4); also that the same kind of cells are arranged "on the surface" of *Stelletta aspera* "in a tessellated manner" in "distinct cavities" of the same kind of sarcodal trama or fibrillous structure as in *Dercitus niger*, while such cells were not only to be found on the surface, but also "scattered throughout the sponge generally" (probably in connexion with the epithelial lining of the excretory canals), together with here and there a cell charged with black granules, also precisely like those of *Dercitus niger* (*ib.* p. 7). Thus it was observed that the material of the dark pigment was seated in the "granules" themselves, that is little cellulæ, although not always making itself visible.

Unfortunately a typographical error occurs here which causes the measurement of these cells to appear as "1-170th of an inch" in diameter, instead of 1-750th or 8-6000ths, which it ought to have been; thus they are a little larger than those of *Dendrilia rosea*, which, according to my measuring, vary under 6-6000ths, as will more particularly appear hereafter.

Schulze alludes to a layer of these cells in *Aplysina aerophoba* under the term "ectoderm" (*Zeitschrift f. wiss. Zoologie*, Bd. xxx. p. 392), and Lendenfeld does the same under the name of "Plattenepithel" in *Dendrilia rosea* (*ib.* Bd. xxxviii. p. 281, Taf. xii. fig. 19 E c), while Polëjaeff has given a representation of them in his *Cacospongia vesicutifera*, adding that they are "not dissimilar to the renowned and still debatable 'Schleimzellen' of Mollusca, as Dr. Fleming has drawn them, and thoroughly identical with the vesicular cells of many Desmacidonidæ undescribed hitherto, but undoubtedly very well known to every spongologist who has had to deal with the representatives of the family [Spongelidæ] just mentioned" ('Challenger' Reports, 1884, KERATOZOA, p. 59 of separate copy).

In some fragments of the soft, fibro-reticulated, dermal structure of a specimen of *Dendrilia rosea* which had fallen off from the skeleton during maceration, the circular cavities alone occupied by some of these cells remained, even after portions had been stained, dried, and mounted in balsam, so that it became perfectly evident that they had been imbedded in the fibre of the fibro-reticulated structure of the surface in distinct compartments similarly to those above mentioned which exist in a similar tissue in *Dercitus niger*; so that these epithelial cells do not always appear to be confined to a simple lamina.

I have already stated that their granules in *Dercitus niger* bear the black-brown colouring-matter of this sponge,

and that in *Aplysina cruor* they appear outside the cells, from which they seem to have been endogenously derived, in the form of minute granuliferous cellulæ about 1-2-6000ths in. in diameter, still bearing the red colouring-matter of this species. Moreover, in some instances, where somewhat enlarged, they present a nucleus surrounded by minute granules, and in this condition, losing for a time their pigmental character, seem to pass gradually into the largest form of the parents, the epithelial cells beside them; hence my allusion to these particulars where I have above stated that in *Dendrilla rosea* the size of the epithelial cell "varies under 6-6000ths of an inch." So that, by a repetition of this process, the epithelial cells and the pigmental granules are thus continually renewed.

That one function of the epithelial cell is to produce the colouring-matter there can be no doubt; neither can there be any doubt that it does not always perform this function, for in *Aplysina massa*, as above stated, there is with the same kind of epithelial cell no colouring-matter at all. Again, it is not uncommon to find the upper and more exposed portions of a sponge black (where this is the colour), while the lower and more shaded ones are colourless, ex. gr. *Spongia officinalis*, auctt. (see 'Annals' of 1882, vol. ix. p. 272), wherein also the black colour extends for a short distance into the external openings (oscles) of the large excretory canals.

It therefore may be possible (for Nature has always an unlimited number of resources) that they also possess the power of the "Schleimzellen" in Mollusca, as above noticed.

In some sponges, as in Mr. Wilson's Australian one, viz. *Axinella atropurpurea*, already described ('Annals,' 1885, vol. xvi. p. 359), such cells, bearing the colouring-granules, are dispersed generally throughout the mass, where I have before suggested they may still be connected with the lining membrane of excretory canals, although they do not present the flattened form of those on the surface; while in *Suberites Wilsoni*, the great carmine-coloured sponge of South Australia brought to my notice by Mr. Bracebridge Wilson, after whom I have named it, the colouring-matter appears to be diffuse, since I have never been able to find it in granules (*i. e.* the cellulæ of larger cells).

Lastly, I would observe that when the skin of an *Aplysina* and the like sponges is stript off the surface it is found to consist essentially of two layers, the outermost of which is composed of epithelial cells and their pigmental granules (if any) set in transparent sarcode, rendered more or less generally

cribriform by the presence of the "pores" (how far this sarcode may belong to the epithelial cells individually, and thus being agglomerated possess a general motory power like that of an *Amœba* or *Myxogaster* (*Æthaliium*), I am not prepared to say),—and the innermost layer of a soft fibro-reticulated structure, in which the fibre is composed of fibrillæ in the form of elongated, linear, (?) muscular cells. The pores are best seen over the interstices of the fibro-reticulated layer, as the light then passes directly through them, when the reticulated fibro-framework of *their* structure again appears to be composed of the "transparent sarcode" in which the epithelial cells are imbedded, rendered more or less opaque here and there by the presence of an epithelial cell or two, with other granular matter.

[To be continued.]

XXIX.—*Contributions to the Study of the Littoral Fauna of the Anglo-Norman Islands (Jersey, Guernsey, Herm, and Sark).* By Dr. R. KÖHLER.

[Plate XI.]

[Continued from p. 243.]

JERSEY (*continued*).

CRUSTACEA.

The class Crustacea is represented at Jersey by numerous individuals belonging to various species. It was to the Crustacea, which interested me from various points of view, that I paid attention more particularly during my visits to the Anglo-Norman islands. I shall speak here only of the Decapoda, Isopoda, and Amphipoda. The number of species that I can record amounts to 141; and it is to be remarked that this is nearly the number indicated by Delage in the list given by him of the Crustacea of Roscoff, namely 119.

Decapoda.

Stenorhynchus phalangium, Edw., and *tenuirostris*, Bell, occur very commonly among the rocks. A third and more